Saskatchewan Learning Enrolment Projections for Kindergarten to Grade 12, 2003-2004 to 2012-13

January 2003 Update

Assessment & Evaluation Unit

January 2003

Saskatchewan Education Enrolment Projection to 2012-13

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Introduction

What is the purpose of projecting student enrolments?

During June of 2000, as part of a Department strategic planning exercise, the Assessment and Evaluation Unit undertook to produce enrolment projections for the first decade of the new millennium. The projection model was modified and run again in June 2001 and the data generated were used in the Department's *Teacher Supply and Demand in Saskatchewan* document, as well as to inform senior management of the updated trends. This January 2003 set of enrolment projections was derived after backtesting several models, and then using a 'trending-fluctuating' combination model.

The projections present a basis upon which all partners in Saskatchewan's education system can proceed with thoughtful and responsible planning.

Who is included in these enrolment projections?

Included in this document are enrolments in provincial schools and those in independent schools 'associated' with public or separate school divisions. Although enrolments and projections for other schools or home-based education are approximated in the data analysis, the summary figures provided in the projection (other than Figures 1 and 6) **do not** include:

- Historical high schools not 'associated' with a public or separate school division
- Other independent schools not 'associated' with a public or separate school division
- First Nations (Band) schools
- Students participating in home-based education

Why are changes made to the projection model? What changes were made?

Making enrolment projections and the accuracy of those projections are dependent on a number of factors and are very sensitive to cohort retention ratios (CRR) predicted for each grade. Generally speaking, these ratios compare the size of the most recent year's enrolment for a particular grade divided by the previous year's, previous grade's enrolment. These ratios can fluctuate significantly from one year to the next, may seem to trend for a while, and then change direction. For every one percent overall discrepancy between predicted and actual CRR values, the resulting discrepancy between predicted and actual enrolment numbers might vary by almost 2 000 students.

Unless there is reason to believe that a fundamental change is occurring that would affect CRR values in a particular direction, one would assume that the projected CRR values would be higher than the actual values about half the time and lower than the actual values the other half the time. However, the June 2001 projection model, using a moving 5-year average to track student retention, consistently underestimated actual population totals in the backtesting of its use. Considerable experimentation was done to test other projection models. The method selected for the January 2003 projections is called the *Blended Flatline - Adjusted 5-Year Average CRR Flatline Method*. Although the method can show considerable discrepancies between projected and actual enrolments when backtesting the model, it seems to be superior to the 5-*Year Moving Average CRR (Version 2) Method* used in the June 2001 projections.

A detailed description of the algorithms and assumptions of the *Blended Flatline - Adjusted 5-Year Average CRR Flatline Method* appears on pages 8-10 and in Appendix B. In addition to changes to the CRR calculation method, differences in this set of projections compared to the June 2001 projections are a result of a number of other changes, such as:

- special education enrolments are integrated within grades (instead of segregating special education enrolments and appending them at the end);
- number of First Nations births have been integrated with non-First Nations births and designated as rural, urban, and northern;
- including 2001-02 and 2002-03 actual enrolments in the projections;
- including the 2001-02 and 2002-03 cohort retention ratios in the projections; and,
- including the 2001 birth numbers and subsequent birth projections for the province.

Some of the backtesting results of selected CRR calculation methods are included in Appendix D to show how the various methods performed.

Data sources for the projections were Statistics Canada's medium-growth rate scenario, the Department's School Finance Branch and Saskatchewan Health.

What might be some of the factors that would cause the cohort retention ratios to trend?

Cohort retention ratios (CRR) will always fluctuate depending on a number of factors including in- and out-migration and student persistence in completing grades over longer periods of time. A trend in these factors will contribute to a trend in the CRR values.

In addition to these, two factors may have had additional influence. There has been flow of First Nations students between provincial and First Nations schools, sometimes affecting entire schools in regions of the province. In most instances, this would have a deflating effect on the CRR values for the year that large shifts occur, which would continue to affect future years' CRR projections, artificially depressing them (if this were a one-time occurrence). Also, in the past few years, some independent schools have gained 'associated' status with publicly-funded school boards, and their enrolments have been included in funded enrolments. This would tend to have a small, temporary inflating effect on the CRR.

Why do this year's enrolment projections hold north enrolments constant at 5,500?

All projection models tested to date function on past data, capturing averages and trends based on what has already happened without exploring the events that may have contributed to the past data and the likelihood of those events continuing into the future. This lack of forward-thinking in the models may limit the accuracy of the predictions, but will probably not affect greatly the overall messages of declining student enrolments in the next ten years. Still, caution is prudent in how these numbers are presented, particularly in some sub-populations of the province.

Projections for the North derived using most tested models have tended to underestimate actual enrolments, and are often seen as being contrary to findings and predictions from other reliable sources. The smaller population (five to six thousand students) lends itself to greater fluctuations in CRR values, which, in turn, can result in higher discrepancies between projected and actual CRR values and cause less-predictable enrolments than is the case in a larger population. Also, there have been some years in the past decade in the North where a provincial school (or part of the school) with a number of hundred students became a First Nations school. This is a sizable proportion of the North's small student population causing significant decline in the CRR due to this infrequent occurrence. This will have a downward (artificial) influence on future CRR projected values for a number of years.

If useful, a future set of projections could be prepared that attempts to factor out some of the influence these infrequent 'transfer' events have on future CRR values in the North. It should be noted that it is not desirable to factor these influences out, if there is reason to believe that such occurrences will continue

with the same frequency in the future. However, in this case, it has been suggested that such events are not likely to occur with a similar frequency in the future.

The enrolments for the North have been held constant at 5,500 because this is the average North enrolment and also the 'trended' North enrolment (rounded to the nearest hundred) over the past five years. Please note that birth numbers in the North have averaged around 600 annually during the past six years, down from an average of about 700 annually during the previous eight years. Of course, this, along with other factors, will affect actual future enrolments in the North.

It should also be noted that inaccuracies in the rural and urban breakdowns will occur as a result of the effect that reclassification of school divisions from rural to urban will have on the corresponding sets of CRR values. In the past decade, school divisions in Melville and Humboldt have become urban school divisions, and as practiced in *Saskatchewan Education Indicators* reports, all schools in the divisions would be reclassified as urban (*Indicators* defines rural school divisions as those which have no schools in the 13 Saskatchewan cities). This would tend to artificially increase urban CRR values and decrease rural CRR values, and these would be compounded to future years' enrolments.

Consequently, one would expect the sub-population breakdowns to be less reliable than the overall provincial enrolment projections.

Projection Summary Highlights

- Numbers presented in this report are estimates. Actual enrolments in the future will be different than those presented in the report. However, there is substantive data to support the main message of significantly declining student enrolment numbers, year by year, over the next 8-10 years.

- The main contributor to the decline in student enrolments is the low birth numbers during the past decade. The result is that there are 3000 to 4000 fewer students entering Kindergarten than there are completing Grade 12.

- Results of the projection model predict a student enrolment of 174,212 for the 2003-04 school year and a total student enrolment of almost 147,000 by 2012-13.

- Over the next ten years, enrolment declines are anticipated in the rural (-20%), and urban (-17%) sub-populations. The North sub-population has been held constant at 5,500 (see section above).

- In the early to mid-90's, cohort sizes of all grades were similar. Since then, cohort sizes at the younger grades are significantly smaller than those at the older grades. The largest cohort sizes are currently in Grades 9-12. For the next few years, these grades will remain quite large while the small cohort sizes in the elementary grades will continue and spread to the middle years.

- Projections in this document are somewhat higher than those reported in the June 2001 projection report. Pages 11 and 12 show these differences and describe some of the reasons contributing to them. (Definitions, assumptions and considerations of the model are described on pages 8 through 10 of this report.)

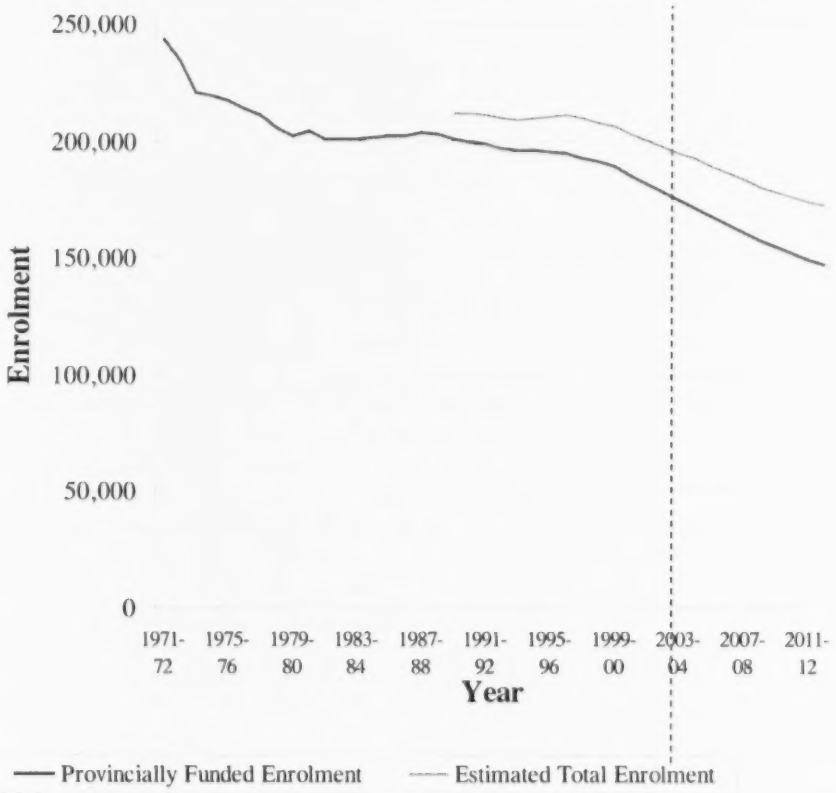
Historical Enrolments and Future Projections (1971-2012)

Table 1 : Projected Enrolments in Saskatchewan 1971-72 to 2012-13

Year	Provincially Funded Enrolment	Estimated Total Enrolment
1971-72	243,047	
1972-73	233,879	
1973-74	220,340	
1974-75	218,954	
1975-76	217,084	
1976-77	213,776	
1977-78	210,556	
1978-79	205,571	
1979-80	201,735	
1980-81	203,573	
1981-82	200,385	
1982-83	200,516	
1983-84	200,251	
1984-85	200,998	
1985-86	201,888	
1986-87	201,711	
1987-88	203,250	
1988-89	202,447	
1989-90	200,276	211,773
1990-91	198,916	211,213
1991-92	198,412	210,886
1992-93	196,235	209,210
1993-94	195,770	208,997
1994-95	195,279	209,251
1995-96	194,602	210,204
1996-97	193,875	210,711
1997-98	192,446	209,296
1998-99	190,673	207,114
1999-00	188,594	206,028
2000-01	184,494	202,735
2001-02	181,101	199,995
2002-03	177,575	197,079
2003-04	174,212	194,384
2004-05	171,032	191,856
2005-06	167,534	188,983
2006-07	164,127	186,176
2007-08	160,487	183,096
2008-09	156,835	179,965
2009-10	154,024	177,651
2010-11	151,295	175,439
2011-12	148,876	173,492
2012-13	146,837	172,031

Note: Forecasted numbers are in the shaded area

Figure 1: Projected Enrolments in Saskatchewan 1971 to 2012



Note: Total enrolments include estimates of students attending First Nations schools, independent schools and those learning through home-based education.

Enrolments and Projections, Rural, Urban and North (1994-2012)

Figure 2: Enrolment Projections by Location, 1997-98 to 2012-13

Blended Flatline - Adjusted 5-Year Average CRR Method

Year	RURAL	URBAN	NORTH	TOTAL
1997-98	75,800	111,114	5,532	192,446
1998-99	73,977	111,148	5,548	190,673
1999-00	72,371	110,687	5,536	188,594
2000-01	69,692	109,205	5,597	184,494
2001-02	66,436	109,223	5,442	181,101
2002-03	64,471	107,628	5,476	177,575
2003-04	62,438	106,274	5,500	174,212
2004-05	60,789	104,743	5,500	171,032
2005-06	59,063	102,971	5,500	167,534
2006-07	57,467	101,160	5,500	164,127
2007-08	55,914	99,073	5,500	160,487
2008-09	54,603	96,732	5,500	156,835
2009-10	53,641	94,884	5,500	154,024
2010-11	52,755	93,041	5,500	151,295
2011-12	52,069	91,307	5,500	148,876
2012-13	51,501	89,836	5,500	146,837

Note: Forecasted numbers are in the shaded area

Figure 2: Blended Flatline - Adjusted 5-Year Average CRR Method
Forecasted Enrolments by Location, 1997-98 to 2012-13

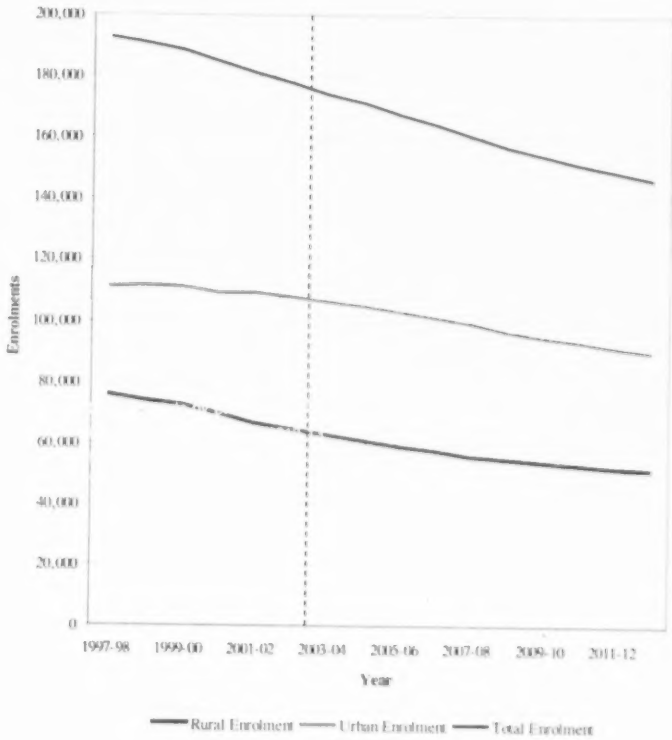


Figure 2a: RURAL Enrolments : Blended Flatline - Adjusted 5-Year Average CRR Method, 1997-98 to 2012-13

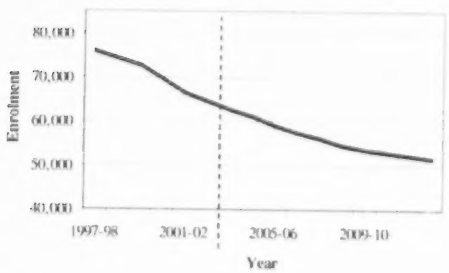


Figure 2b: URBAN Enrolments : Blended Flatline - Adjusted 5-Year Average CRR Method, 1997-98 to 2012-13

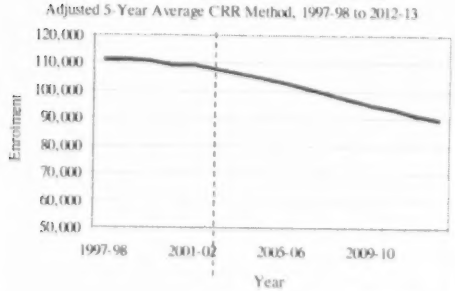
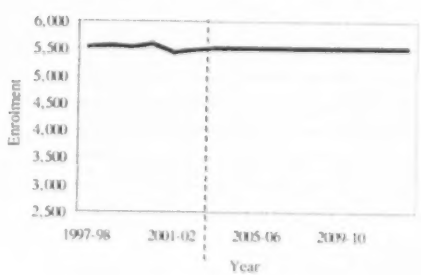


Figure 2c: North Enrolments, 1997-98 to 2012-13



Enrolments and Projections, by Grade

Figure 3: Provincial Enrolment Projections, by Grade

YEAR	BIRTHS	K	G1	G2	G3	G4	G5	G6	G7	G8	G9	G10	G11	G12	SPECIAL EDUCATION (non-graded)
1997-98T	12,309	13,636	14,628	14,634	14,532	14,336	14,359	14,447	15,001	14,973	14,930	15,448	14,135	14,820	2,567
1998-99T	12,216	13,050	14,404	13,921	14,491	14,493	14,300	14,287	14,509	14,962	15,006	15,552	14,324	15,033	2,341
1999-00T	12,060	12,790	13,835	13,564	13,683	14,381	14,449	14,303	14,295	14,462	14,960	15,459	14,306	15,697	2,410
2000-01T	11,645	12,056	13,301	13,027	13,323	13,584	14,231	14,266	14,188	14,077	14,509	15,663	14,216	15,607	2,446
2001-02T	11,846	11,975	12,690	12,655	12,828	13,225	13,382	14,101	14,165	14,063	14,146	15,029	14,448	15,632	2,762
2002-03T	11,475	11,403	12,490	12,077	12,445	12,833	13,255	13,379	14,281	14,108	14,385	15,120	14,112	16,098	1,589
2003-04T	11,645	11,317	12,372	11,903	11,939	12,457	12,900	13,371	13,545	14,305	14,511	15,415	14,296	15,777	
2004-05T	11,546	11,172	12,278	11,710	11,684	11,869	12,439	12,930	13,369	13,410	14,540	15,370	14,362	15,733	
2005-06T	11,448	10,788	12,122	11,622	11,495	11,616	11,853	12,468	12,928	13,236	13,630	15,401	14,320	15,805	
2006-07T	11,351	10,974	11,704	11,473	11,409	11,428	11,600	11,880	12,467	12,799	13,453	14,438	14,349	15,759	- included in
2007-08T	11,254	10,630	11,906	11,079	11,263	11,342	11,412	11,627	11,878	12,342	13,010	14,250	13,451	15,791	K-12
2008-09T	11,159	10,788	11,534	11,270	10,875	11,197	11,326	11,439	11,625	11,760	12,545	13,780	13,276	14,803	enrolment
2009-10T	11,064	10,697	11,705	10,917	11,063	10,812	11,182	11,352	11,437	11,509	11,953	13,288	12,839	14,611	projections
2010-11T	10,970	10,606	11,605	11,079	10,717	10,998	10,797	11,208	11,351	11,323	11,698	12,661	12,380	14,129	
2011-12T	10,876	10,515	11,507	10,985	10,876	10,654	10,983	10,822	11,206	11,238	11,509	12,391	11,796	13,625	
2012-13T	10,784	10,426	11,409	10,891	10,783	10,812	10,639	11,009	10,820	11,094	11,422	12,191	11,545	12,982	

Note: Numbers in shaded areas are projected. Projected numbers include estimates of special education (non-graded) enrolments apportioned to the K-12 grades. As a result, for better comparisons between projected enrolments and previous years' actual enrolments, the reader should first apportion special education (non-graded) enrolments to each of the grades' actual enrolments (in the non-shaded area). Numbers do not add perfectly to totals in Figures 1 and 2, because these are the numbers prior to the adjustment made to hold constant (5500) the enrolments in the North.

Figure 4: Urban Enrolment Projections, by Grade

YEAR	BIRTHS	K	G1	G2	G3	G4	G5	G6	G7	G8	G9	G10	G11	G12	SPECIAL EDUCATION (non-graded)
1997-98U	6,962	8,301	8,667	8,591	8,316	8,132	8,075	7,976	8,335	8,220	8,226	8,892	8,138	9,207	2,038
1998-99U	7,072	7,839	8,594	8,168	8,477	8,263	8,128	8,038	8,095	8,389	8,570	9,134	8,350	9,207	1,897
1999-00U	6,761	7,811	8,203	8,030	7,976	8,348	8,184	8,092	8,057	8,130	8,727	9,105	8,435	9,672	1,917
2000-01U	6,527	7,194	7,969	7,685	7,811	7,934	8,204	8,067	8,037	7,923	8,426	9,442	8,516	9,968	2,029
2001-02U	6,694	7,279	7,610	7,604	7,672	7,822	7,896	8,204	8,182	8,101	8,498	9,354	8,938	10,110	1,953
2002-03U	6,632	6,901	7,547	7,187	7,393	7,681	7,807	7,874	8,416	8,188	8,585	9,320	8,836	10,606	1,287
2003-04U	6,571	6,925	7,323	7,172	7,089	7,425	7,721	7,917	8,110	8,537	8,831	9,615	9,013	10,596	
2004-05U	6,510	6,640	7,421	6,900	7,016	7,061	7,406	7,768	8,007	8,086	9,037	9,721	9,114	10,566	
2005-06U	6,450	6,416	7,116	6,991	6,749	6,988	7,043	7,452	7,855	7,985	8,555	9,935	9,208	10,678	
2006-07U	6,390	6,574	6,870	6,705	6,838	6,723	6,970	7,086	7,535	7,832	8,447	9,403	9,405	10,773	- included in
2007-08U	6,331	6,362	7,040	6,475	6,557	6,811	6,706	7,012	7,166	7,514	8,278	9,278	8,894	10,979	K-12
2008-09U	6,273	6,452	6,814	6,635	6,333	6,532	6,792	6,748	7,090	7,145	7,944	9,089	8,785	10,371	enrolment
2009-10U	6,215	6,393	6,911	6,422	6,489	6,309	6,516	6,833	6,825	7,069	7,556	8,721	8,596	10,243	projections
2010-11U	6,157	6,334	6,847	6,513	6,281	6,464	6,293	6,557	6,910	6,806	7,470	8,300	8,256	10,010	
2011-12U	6,100	6,275	6,783	6,453	6,370	6,257	6,447	6,332	6,633	6,889	7,202	8,196	7,851	9,617	
2012-13U	6,044	6,217	6,720	6,393	6,311	6,346	6,241	6,487	6,405	6,615	7,281	7,914	7,756	9,148	

Note: Numbers in shaded areas are projected. Projected numbers include estimates of special education (non-graded) enrolments apportioned to the K-12 grades. As a result, for better comparisons between projected enrolments and previous years' actual enrolments, the reader should first apportion special education (non-graded) enrolments to each of the grades' actual enrolments (in the non-shaded area).

Figure 5: Rural Enrolment Projections, by Grade

YEAR	BIRTHS	K	G1	G2	G3	G4	G5	G6	G7	G8	G9	G10	G11	G12	SPECIAL EDUCATION (non-graded)
1997-98R	4,735	4,869	5,401	5,552	5,712	5,713	5,801	6,058	6,233	6,393	6,320	6,195	5,782	5,408	363
1998-99R	4,593	4,763	5,246	5,261	5,555	5,738	5,686	5,776	5,997	6,178	6,055	5,968	5,735	5,635	384
1999-00R	4,695	4,536	5,090	5,056	5,229	5,565	5,798	5,723	5,764	5,955	5,860	5,966	5,655	5,805	389
2000-01R	4,503	4,432	4,802	4,864	5,051	5,177	5,560	5,724	5,668	5,706	5,703	5,755	5,469	5,408	373
2001-02R	4,550	4,311	4,588	4,617	4,752	4,971	5,062	5,483	5,542	5,575	5,291	5,256	5,218	5,295	475
2002-03R	4,515	4,092	4,440	4,482	4,623	4,745	5,001	5,094	5,385	5,464	5,320	5,285	5,011	5,227	302
2003-04R	4,480	4,034	4,555	4,310	4,468	4,610	4,779	5,014	5,017	5,328	5,219	5,209	4,967	4,929	
2004-05R	4,445	4,138	4,413	4,396	4,274	4,433	4,620	4,768	4,914	4,940	5,059	5,082	4,885	4,866	
2005-06R	4,411	3,970	4,519	4,259	4,359	4,240	4,442	4,609	4,672	4,839	4,689	4,920	4,763	4,782	
2006-07R	4,376	4,008	4,338	4,361	4,222	4,325	4,250	4,431	4,517	4,600	4,591	4,559	4,608	4,656	- included in K-12 enrolment projections
2007-08R	4,342	3,886	4,380	4,188	4,324	4,189	4,333	4,240	4,343	4,448	4,361	4,462	4,265	4,494	
2008-09R	4,309	3,946	4,246	4,228	4,153	4,290	4,198	4,323	4,154	4,276	4,218	4,236	4,178	4,156	
2009-10R	4,275	3,916	4,312	4,099	4,193	4,121	4,298	4,189	4,238	4,090	4,056	4,096	3,963	4,071	
2010-11R	4,242	3,885	4,279	4,162	4,064	4,160	4,129	4,288	4,104	4,174	3,877	3,942	3,835	3,855	
2011-12R	4,209	3,855	4,245	4,130	4,127	4,032	4,169	4,120	4,204	4,040	3,961	3,763	3,687	3,734	
2012-13R	4,177	3,825	4,212	4,098	4,095	4,095	4,041	4,160	4,039	4,141	3,830	3,851	3,523	3,591	

Note: Numbers in shaded areas are projected. Projected numbers include estimates of special education (non-graded) enrolments apportioned to the K-12 grades. As a result, for better comparisons between projected enrolments and previous years' actual enrolments, the reader should first apportion special education (non-graded) enrolments to each of the grades' actual enrolments (in the non-shaded area).

Figure 6: First Nations Schools Student Enrolment Projections, by Grade

YEAR	BIRTHS	K	G1	G2	G3	G4	G5	G6	G7	G8	G9	G10	G11	G12	SPECIAL EDUCATION (non graded
1997-98F	2,409	1,192	1,422	1,233	1,119	1,069	1,062	966	1,004	876	821	882	418	417	3
1998-99F	2,523	1,274	1,385	1,245	1,133	1,108	998	1,016	927	860	766	811	412	397	13
1999-00F	2,563	1,255	1,547	1,281	1,172	1,172	1,111	1,058	1,042	925	905	886	517	492	21
2000-01F	2,632	1,232	1,552	1,417	1,250	1,164	1,182	1,112	1,163	1,056	930	1,031	553	629	25
2001-02F	2,711	1,224	1,417	1,358	1,378	1,260	1,197	1,177	1,155	1,105	1,028	1,029	586	577	31
2002-03F	2,790	1,321	1,456	1,295	1,331	1,413	1,295	1,234	1,263	1,151	1,124	1,187	644	698	19
2003-04F	2,871	1,376	1,590	1,328	1,272	1,362	1,456	1,334	1,327	1,261	1,172	1,301	748	760	
2004-05F	2,955	1,398	1,665	1,438	1,291	1,290	1,391	1,484	1,416	1,308	1,266	1,337	805	855	
2005-06F	3,041	1,438	1,692	1,506	1,398	1,310	1,317	1,418	1,576	1,395	1,314	1,444	827	920	
2006-07F	3,130	1,479	1,737	1,530	1,465	1,418	1,337	1,343	1,505	1,553	1,401	1,498	894	946	- included in K-12 enrolment projections
2007-08F	3,221	1,522	1,789	1,571	1,488	1,485	1,447	1,363	1,425	1,483	1,560	1,598	927	1,022	
2008-09F	3,315	1,566	1,842	1,618	1,528	1,509	1,516	1,476	1,447	1,405	1,490	1,779	989	1,060	
2009-10F	3,411	1,612	1,895	1,665	1,574	1,549	1,540	1,546	1,567	1,426	1,411	1,699	1,101	1,131	
2010-11F	3,511	1,659	1,950	1,714	1,620	1,596	1,581	1,570	1,641	1,544	1,432	1,609	1,052	1,259	
2011-12F	3,613	1,707	2,007	1,764	1,667	1,642	1,629	1,613	1,667	1,617	1,551	1,633	996	1,202	
2012-13F	3,718	1,757	2,066	1,815	1,715	1,690	1,676	1,661	1,712	1,642	1,624	1,769	1,011	1,139	

Note: Numbers in shaded areas are projected. Projected numbers include estimates of special education (non-graded) enrolments apportioned to the K-12 grades. As a result, for better comparisons between projected enrolments and previous years' actual enrolments, the reader should first apportion special education (non-graded) enrolments to each of the grades' actual enrolments (in the non-shaded area).

Projection Algorithms, Definitions, Assumptions and Explanatory Notes

Enrolments:

1) Provincial school enrolments are categorized as rural, urban or northern as defined by the type of school division. Northern school divisions include Northern Lights, Ile la Crosse and Creighton. Urban school divisions are those with at least one school in the 13 urban centres of the province. All other school divisions are classified as rural. Note that some schools may be located in a rural setting but are part of an urban school division, therefore their enrolments are considered urban.

2) Enrolments in the North have been held constant at 5,500 (see Introduction for explanation).

3) Special Education (non-graded) enrolments have been apportioned and integrated in enrolments from Grades 1 to 12 (i.e., an equal proportion of elementary special education students were added to Grade 1 to 5, middle-level special education students apportioned to Grade 6 to 9, secondary-level special education students divided equally into Grades 10 to 12). Integrating these enrolments is more consistent with the Department's philosophy and smooths out significant fluctuations found year-by-year, particularly in the North. In the Figures 3 through 6, special education enrolments remain separate from grade enrolments for past years' data, but they are included in grade enrolments for the projected years.

4) "Non-Funded Enrolment" (such as independent school enrolment and students experiencing home-based education) has been averaged over the most recent 5-year period, and projected to continue using a 5-year moving average. These enrolments are included in the total enrolment numbers and projections shown in Figure 1. Some independent schools have become associated with school divisions in recent years and their enrolment numbers have been included in the provincial funded enrolment totals.

5) Enrolments in First Nations Schools were included to derive a total provincial enrolment. These are included in the total enrolment numbers and projections shown in Figure 1 and are provided, grade by grade, in Figure 6. First Nations students attending schools off-reserve are included in the provincial school enrolments. Projections account for future First Nations enrolments in provincial schools by way of the cohort retention ratio (CRR) calculation. It should be noted that with self-governance discussions, the CRR numbers could change significantly reflecting potentially fewer off-reserve First Nations students in provincial schools, thereby resulting in fewer provincial school students than projected.

Cohort Retention Ratios:

1) An actual cohort retention ratio (CRR) for each grade is calculated for past years based on known past enrolments and birth numbers as follows:

   - For Kindergarten, the CRR is calculated by dividing the previous year's kindergarten enrolment by the number of births in the province five years earlier. (e.g., KIND 2002-03 CRR = KIND 2002-03 / Births 1997-98)

- For Grade 1, the CRR is calculated by dividing the previous year's Grade 1 enrolment by the number of births in the province six years earlier. (e.g., Gr.1 2002-03 CRR = Gr.1 2002-03 / Births 1996-97)
- For the other grades, the CRR is calculated by dividing the previous year's enrolment for that grade by the year earlier enrolment for the preceding grade. (e.g., Gr.2 2002-03 CRR = Gr.2 2002-03 / Gr.1 2001-02)
- In general, this becomes: Gr.x 2002-03 CRR = Gr.x 2002-03 / Gr.(x-1) 2001-02 (for x = 2 ... 12)

2) Enrolments projected in this report are based on predictions of CRR values for future years, calculated using the *Blended Flatline - Adjusted 5-Year Average CRR Flatline Method*. This method tests to see if there is evidence of a trend using the most recent five years' CRR values on a grade-by-grade basis. For each grade, one of two CRR calculation methods will be used: the *Flatline Method*, if there is evidence of a trend or the *Adjusted 5-Year Average CRR Flatline Method*, if recent CRR values for that grade are fluctuating instead of trending. The two methods are briefly described below.

   a) The *Flatline Method* uses the most recent year's CRR value for a particular grade and makes enrolment projections based on this fixed set of values.

   b) The *Adjusted 5-Year Average CRR Flatline Method* attempts to 'learn' from its past discrepancies between actual and predicted CRR values. This method involves the following steps:
      - For each grade, the CRR values for the most recent five-year period are averaged.
      - A CRR adjustment factor is calculated for each grade. To do so, the actual CRR value is compared with the 5-year average CRR value prediction. Differences between the actual and predicted values are captured for each year and grade, and then averaged for the most recent five years. The CRR adjustment factor is limited within specific parameters.
      - For each grade, the CRR value is predicted for the first future year by averaging the past five years' CRR values and adding to this the CRR adjustment factor. These same CRR predicted values for each grade are repeated and used for all future years of the projection period.

   The blended method and its two components are explained in more detail, along with other possible methods, in Appendix B of this report.

3) CRR values are calculated for both the province as a whole and for designated locations (rural, urban and North) or groups (First Nations). This allows for projections that are more responsive to changes in the proportion of births and enrolment trends among different groups or locations.

4) Provincial CRR values were assumed to be more stable than location/group CRR values, so the projection model bases projections on the provincial CRR. Small adjustments are made to the location CRR values to ensure internal consistency in the projections (i.e., to ensure that the sum of the parts is equal to the whole).

5) Cohort retention ratios may be greater than one (100%) because of migration, flow of First Nations students between systems, and because of rurally-located schools classified to be in urban school divisions.

Birth Projections:

1) Projected birth numbers were calculated based on a continuation of current trends (averaging trends over the most recent 7 years, weighted to be most responsive to the most recent years). Statistics Canada's "medium growth scenario (Projection 3)" projections for the Age 0-4 population were used to verify that the projected birth numbers seemed reasonable.

2) Using current compound growth rates in rural, urban and northern locations, the provincial birth projections were attributed accordingly to each of these locations. Small adjustments were made to the birth projections for the groups to ensure the total births equaled the provincial births.

3) Rural, urban and northern births include First Nations births. Also included on the detailed projection spreadsheet are total First Nations births to allow some trend exploration of enrolments in First Nations schools.

Note: Actual birth rates depend on many factors including migration and fertility rates. Differences between these factors and the assumptions made in arriving at birth projections will have significant impact on the projections for 2008 and later.

Criteria for Selecting a CRR Calculation Method

The selection of which prediction method to use was based on two criteria: backtested success and the logic behind the method. First, backtested results showed there could be large discrepancies and inconsistent method strengths over different periods of time. At times, a one-year-ahead prediction might be as close as 10 students different than actual enrolments and, at other times, as large as a 2500 discrepancy. Of the methods tested:

- the *Flatline Method* produced good overall estimates both for near-term and long-term projections
- the *Five-Year Average CRR Flatline Method* performed poorly in comparison
- the *Adjusted 5-Year Average CRR Flatline Method* was an improvement over the other five-year averaging methods, but inferior to the Flatline Method
- the *Blended Flatline - Adjusted 5-Year Average CRR Flatline Method* (the chosen method) showed a backtesting accuracy track record comparable to the *Flatline Method*

A small sample of backtested results for a subset of methods tested is included in Appendix D.

The second criterion for selection considered the logic behind the method. The *Flatline Method* backtesting results were among the strongest for the tested methods. This might support the suggestion by some that the present (i.e., the one most recent year's data) is the best predictor of the future. However, the fact that it only considers the most recent year's information leaves it vulnerable to extraordinary years, changing trends or fluctuating values, and is contrary to the view of others who would suggest there tends to be regression to the mean (movement toward the average value) when looking to the future.

The *Blended Flatline - Adjusted 5-Year Average CRR Flatline Method* uses, for each grade, one of two methods, depending on whether there is evidence of a trend in the CRR

values. The combination of methods credits the 'track record' of the two methods but allows for flatlining or averaging and adjusting functions to accommodate the most recent indication of whether trending or fluctuating seems to be occurring on a grade-by-grade basis. From a logic viewpoint, this blend should add strength to the projection model. From a practical viewpoint, backtesting shows its contribution has had little positive or negative effect on overall accuracy, to date (due to the hard-to-predict and somewhat chaotic nature of CRR values).

Refinements of the methods and exploration of other methods may provide reason to adopt a different method in future projection reports.

Comparisons to the June 2001 Projections

The last released report on student enrolment projections was prepared in June 2001. It projected a 2003-04 student enrolment of 171,993 using the *5-Year CRR Moving Average (Version 2) Method*. In this report, 2003-04 student enrolment is projected to be 174,212 using the *Blended Flatline - Adjusted 5-Year Average CRR Flatline Method*. Figure 7 shows projections made in January 2003 compared to those made in June 2001.

Figure 7: Comparisons Between June 2001 Projections and January 2003 Projections

	Blended Flatline - Adjusted 5-Year Average CRR Method				5 year Moving Average Method (2)			
	January 2003 Projections				June 2001 Projections			
Year	RURAL	URBAN	NORTH	TOTAL	RURAL	URBAN	NORTH	TOTAL
1994-95	83,648	106,018	5,613	195,279	83,648	106,018	5,613	195,279
1995-96	82,399	106,802	5,401	194,602	82,399	106,802	5,401	194,602
1996-97	81,305	107,112	5,458	193,875	81,305	107,112	5,458	193,875
1997-98	75,800	111,114	5,532	192,446	75,800	111,114	5,532	192,446
1998-99	73,977	111,148	5,548	190,673	73,977	111,148	5,548	190,673
1999-00	72,371	110,687	5,536	188,594	72,371	110,687	5,536	188,594
2000-01	69,692	109,205	5,597	184,494	69,692	109,205	5,597	184,494
2001-02	66,436	109,223	5,442	181,101	67,021	108,017	-	180,504
2002-03	64,471	107,628	5,476	177,575	64,252	106,836	-	176,465
2003-04	62,438	106,274	5,500	174,212	61,955	104,862	-	171,993
2004-05	60,789	104,743	5,500	171,032	60,076	102,755	-	167,836
2005-06	59,063	102,971	5,500	167,534	58,097	100,607	-	163,524
2006-07	57,467	101,160	5,500	164,127	56,172	98,232	-	159,015
2007-08	55,914	99,073	5,500	160,487	54,278	95,630	-	154,305
2008-09	54,603	96,732	5,500	156,835	52,609	92,630	-	149,433
2009-10	53,641	94,884	5,500	154,024	51,250	89,803	-	145,033
2010-11	52,755	93,041	5,500	151,295	49,972	87,054	-	140,799
2011-12	52,069	91,307	5,500	148,876	-	-	-	-
2012-13	51,501	89,836	5,500	146,837	-	-	-	-

Note: As described in the Introduction and Projection Algorithms, Definitions, Assumptions and Explanatory Notes sections of the report, student enrolment projections for the North have been held constant at 5,500.

As stated earlier, projections are made on the basis of assumptions and trends. The accuracy of the projections is subject to how well the assumptions are reflected in actual practice. The January 2003 (new) projections predict higher enrolments than did the June 2001 (old) projections, primarily due to the following:

- The new projections for 2003-04 are based on the actual enrolment for 2002-03 (177,595) and the old projections are based on the past projected enrolment for 2002-03 (176,465). This would have a rippling, compounding effect through the 10-year projection period.
- For the new projections, special education student enrolments were integrated into the Grade 1-12 enrolments, apportioning elementary, middle and secondary special education students into the appropriate grades. This is more consistent with the inclusive philosophy of Saskatchewan's education system, and serves to smooth out large fluctuations of special education numbers that may occur in smaller sub-populations (e.g., the North). Previous years' projections separated out these non-graded enrolments and added them at the end of the projection process. This change can have a variable effect on projections, but tends to lower the overall provincial projected numbers.
- The actual cohort retention ratios (CRR) for 2002-03 were generally higher than those projected in the old projections. Again, this would have a rippling, compounding effect that would give somewhat higher projections for subsequent years.
- The CRR adjustment factors applied to corresponding 5-year average values and the blending with the flatlined CRR values result in different CRR values for the method used in June 2001 and for the method used in January 2003.
- Birth numbers for 2001-02 were slightly higher than those anticipated by the old projections. Updating the birth number projections based on the new data result in slightly higher estimates, and have a small rising effect for projections six to ten years in the future.

Appendix A – Birth Numbers and Projections

Birth Projections

Actual Birth Numbers: 1988-2001

Year	Rural Births	Urban Births	North Births	First Nations Births	Total Births
1988	6,515	9,140	713	1,818	16,368
1989	6,407	9,083	727	1,888	16,217
1990	6,015	8,952	719	2,029	15,686
1991	5,683	8,490	669	2,128	14,842
1992	5,394	8,472	726	2,220	14,592
1993	5,112	7,992	715	2,147	13,819
1994	5,038	7,894	681	2,262	13,613
1995	4,882	7,537	693	2,364	13,112
1996	4,784	7,203	576	2,207	12,563
1997	4,735	6,962	612	2,409	12,309
1998	4,593	7,072	551	2,523	12,216
1999	4,695	6,761	604	2,563	12,060
2000	4,503	6,527	615	2,632	11,645
2001	4,550	6,694	602	2,711	11,846

Birth Rate Projections: 2001-2011 Projected Growth Rates

	Rural Rates	Urban Rates	North Rates	First Nations Rates	Total Rates
1988-1999	-2.7%	-2.4%	-1.3%	3.1%	-2.5%
1989-1999	-2.8%	-2.5%	-1.6%	3.1%	-2.6%
1990-1999	-2.5%	-2.6%	-1.6%	2.7%	-2.5%
1991-1999	-2.2%	-2.3%	-1.0%	2.5%	-2.2%
1992-1999	-1.9%	-2.6%	-2.1%	2.2%	-2.3%
1993-1999	-1.4%	-2.2%	-2.1%	3.0%	-1.9%
1994-1999	-1.4%	-2.3%	-1.7%	2.6%	-2.0%
1995-1999	-1.2%	-2.0%	-2.3%	2.3%	-1.7%
1996-1999	-1.0%	-1.5%	0.9%	4.2%	-1.2%
1997-1999	-1.0%	-1.0%	-0.4%	3.0%	-1.0%
1998-1999	-0.3%	-1.8%	3.0%	2.4%	-1.0%
1999-2000	-1.6%	-0.5%	-0.2%	2.8%	-0.9%
2000-2001	1.0%	2.6%	-2.1%	3.0%	1.7%
average rate (past 7 years):	**-0.8%**	**-0.9%**	**-0.4%**	**2.9%**	**-0.9%**

Birth Rate Projections: 2002-2011 Projected Numbers

Year	Rural Birth Proj	Urban Birth Proj	North Birth Proj	First Nations Birth Proj	Total Birth Proj
2002	4,515	6,632	600	2,790	11,745
2003	4,480	6,571	597	2,871	11,645
2004	4,445	6,510	595	2,955	11,546
2005	4,411	6,450	592	3,041	11,448
2006	4,376	6,390	590	3,130	11,351
2007	4,342	6,331	587	3,221	11,254
2008	4,309	6,273	585	3,315	11,159
2009	4,275	6,215	583	3,411	11,064
2010	4,242	6,157	580	3,511	10,970
2011	4,209	6,100	578	3,613	10,876

Source: Saskatchewan Health
Contact: Tania Trofimuk
File Received: Births1988-2000ResType
Note: Determination of First Nations births were modified to treat baby as First Nations if either the mother or father self-identified in either the band or treaty number field

Appendix B – The *Blended Flatline - Adjusted 5-Year Average CRR Flatline Method*: Technical Description of the Calculation of CRR Values

The *Blended Flatline - Adjusted 5-Year Average CRR Flatline Method* was the method chosen to produce the projections presented in this report. The method and some reasons for its selection are provided on pages 8-10. The following provides more detailed, technical aspects of the method.

1) Actual, historic cohort retention ratios (CRR) are calculated as follows:
   a) {Year y Grade x CRR} = {Year y Grade x enrolment} / {Year (y-1) Grade (x-1) enrolment} where y is the years 1972-73 through to 2002-03, and x is the grades 2 through 12
   b) {Year y Kindergarten CRR} = {Year y Kindergarten enrolment} / {Year (y-5) birth numbers} where y is the years 1976-77 through to 2002-03
   c) {Year y Grade 1 CRR} = {Year y Grade 1 enrolment} / {Year (y-6) birth numbers} where y is the years 1977-78 through to 2002-03

2) Future CRR values are calculated as follows:
   a) Indicator of whether CRR values are trending or fluctuating is determined for each grade
      - The sign of the slope of a CRR curve is determined at the midpoints between the CRR data points of the most recent five years (produces four results, each either +1 or -1), performed independently for each grade.
      - The four slope sign-values are summed to get the indicator for each grade.
      - A sum of zero is interpreted as an indication of fluctuation of CRR values, and the *Adjusted 5-Year Average CRR Flatline Method* is used. A non-zero sum is interpreted as an indication of trending CRR values, and the *Flatline Method* is used. Independent determinations are made for each grade.
   b) If the *Flatline Method* is triggered, the CRR value for that grade will be a repeat of the most recent year's CRR value for that grade and this value will be repeated for all ten years being projected
   c) If the *Adjusted 5-Year Average CRR Flatline Method* is triggered for a particular grade, the CRR value for that grade is calculated as follows:
      - The CRR values for the most recent five-year period are averaged.
      - A CRR adjustment factor is calculated. This involves:
        - Calculating the differences over the most recent five years between the actual CRR values and what the five-year average would have predicted the CRR values to be
        - Averaging these five deviations between real and predicted CRR values
        - Checking the average deviation to ensure it is no more than 1.29 times the standard deviation of the most recent five years' actual CRR values and to make sure that applying the deviation adjustment would not artificially move the average CRR value to be more than 90 percent toward its minimum or maximum value during the past five years
        - Adjusting the average deviation to ensure it adheres to the limiting factors described in the previous step
      - The projected CRR value is the sum of the adjustment factor and the five-year average CRR value
      - This projected CRR value is repeated for all ten years of the projection period

3) Sub-population (rural, urban, First Nations) CRR values are calculated using a four-year weighted average (40% of the previous-year CRR value + 30% of the two-year-previous CRR value + 20% of the three-year-previous CRR value + 10% of the four-year-previous CRR value), and then adjusted to make sure that the sum of the parts equals the whole.

Appendix C – Other CRR Calculation Methods: Brief Descriptions

Many different calculation methods were explored to calculate CRR values. Some of the main ones are briefly described in this appendix. They are categorized into two types: standalone methods and blended or combined methods.

Standalone Methods:

1) The *Flatline Method* uses the most recent year's CRR value for each grade and makes enrolment projections based on this fixed set of values. Although one might assume basing all future CRR values on one year of data could be too sensitive to special circumstances affecting that year, this method has had one of the best overall track records over the past 15 years.

2) The *Five-Year Average CRR Flatline Method* averages the past five years' CRR values for each grade and uses this fixed set of average values for the next ten years. This method would minimize the effect of a non-characteristic year; however, it would not reflect any trending pattern of CRR values that might be occurring. This method did not do as well over the past 15 years, although it has performed better over the past five or six years.

3) The *Five-Year Moving Average CRR Method* averages the past five years' CRR values for each grade to use for the next year. For subsequent years, it recalculates a new set of CRR values using the past year's projected CRR set along with the previous four years' sets of values. This is the method used in projection reports prepared in 2000 and 2001. The method would provide a delayed, partial response to any existent trend in CRR values. The method should do well for fluctuating, non-trending CRR values. This method performed poorly when backtesting projections through the 1980's and early 90's, but has performed better over the past five or six years.

4) The *Four-Year Weighted Average CRR Flatline Method* calculates for each grade a projected CRR value by adding 40% of the most recent year's CRR value, 30% of the CRR value from two years ago, 20% of the CRR value from three years ago, and 10% of the CRR value from four years ago. This weighted value would then be used for that grade for all ten years of the projection. As one might expect, backtesting of this method produces results between those of the flatline and five-year averages, as its weighting (40-30-20-10-0) is between the weighting of the flatline (100-0-0-0-0) and the five-year average (20-20-20-20-20).

5) The *Adjusted 5-Year Average CRR Flatline Method* attempts to 'learn' from its past discrepancies between actual and predicted CRR values. This method involves the following steps:
   - For each grade, the CRR values for the most recent five-year period are averaged.
   - A CRR adjustment factor is calculated for each grade. To do so, the actual CRR value is compared with the 5-year average CRR value prediction. Differences between the actual and predicted values are captured for each year and grade, and then averaged for the most recent five years. The CRR adjustment factor is limited within specific parameters.

- For each grade, the CRR value is predicted for the first future year by averaging the past five years' CRR values and adding to this the CRR adjustment factor. These same CRR predicted values for each grade are repeated and used for all future years of the projection period.

Using the adjustment factor improved accuracy of predictions (past 15 years data) over the five-year average method, but did not backtest as well as the *Flatline Method.*

6) The *Trending CRR Method* calculates CRR values using the TREND function in Excel. In this instance, the sixth value of a series of CRR values for the most recent six known years is used to predict the unknown value that would follow the CRR values for the most recent five known years. The TREND function assumes a linear trend, approximating the best straight line predicted by the pairs of CRR values. If there is much deviation about the line, the TREND function's prediction will have less dependability. The *Trending CRR Method* produced backtested results superior to the averaging methods, but inferior to the *Flatline Method.*

Blended or Combined Methods:

1) The *Blended Flatline - Adjusted 5-Year Average CRR Flatline Method* was the chosen method of this report and is outlined in detail on pages 8-10 and in Appendix B.

2) The *Last Best by Grade CRR Flatline Method* tests, for each grade, every one of the methods listed below (a-d) to determine the one that best predicted last year's CRR value. This 'best' estimator is used to predict the CRR value for that grade for the ten-year projection period.
   a) The *Flatline Method*
   b) The *Five-Year Moving Average CRR Method*
   c) The *Four-Year Weighted Average CRR Flatline Method*
   d) The *Adjusted 5-Year Average CRR Flatline Method*

   Another version of this method includes the *Trending CRR Method* as a fifth option from which to draw the 'best' estimator. Testing of the expanded version did not fair too well in the backtest performed for various time periods in the past 15 years.

3) The *Last Best by Grade CRR Mirror Method* is similar to the above method in that it tests, for each grade, every one of the methods listed above (a-d) to determine the one that best predicted last year's CRR value. However, instead of flatlining that CRR value for the entire ten-year period, it tests for the best method in each of the past ten years. Whichever method proved best x years ago, it uses the CRR value calculated using that method for x years into the future (where x is from 1 to 10, representing 10 years of the past and 10 years into the future).

Four or five other blended or combined methods were tested, but most did not perform very well during backtesting or, if they did perform well, they did not have strong rationale for why or how they worked.

Appendix D – Backtest Results: Selected Findings

To forecast enrolment projections for future years, predictions must be made for future CRR values. How close these predictions match actual CRR values will determine the accuracy of the projections. Several methods of predicting CRR values were tested against 20 years of historical data to check the accuracy of the methods. Projections were generated for past time periods predicting enrolments one to ten years into the future. The past time periods varied in length.

Four different measures were used to inform the accuracy or 'track record' of the CRR calculation method. These measures are defined and the desired outcome for each is identified below.

- *Over/Under Estimate Percentage* shows the *percentage* of occurrences where the projection over-estimated the actual enrolment (calculated for each grade and for total enrolment). A value close to **50%** indicates the CRR calculation method exhibits no particular bias as it responded to trends or fluctuations in CRR values.
- *Total Accumulated Deviations* shows a running total of the *size* of over-estimation or the *size* of under-estimation, and the extent to which the periods of over-estimation compensate for the periods of under-estimation. A value close to **zero** indicates that, over time, the amount of over-estimation is balancing the amount of under-estimation (positive values mean that total over-estimation is greater than total under-estimation).
- *Sum of Absolute Deviations* keeps a running total of discrepancies between projected overall enrolments and actual overall enrolments, regardless of whether an over-estimation or an under-estimation occurred. For this measure, over-estimations in some grades and under-estimations in other grades in the same year can act to balance one another. Values closer to **zero** indicate greater overall accuracy.
- *Detailed Sum of Absolute Deviations* keeps a running total of discrepancies between projected enrolments and actual enrolments, grade by grade, regardless of whether an over-estimation or an under-estimation occurred. For this measure, over-estimations in some grades and under-estimations in other grades in the same year do not cancel one another. Values closer to **zero** indicate greater overall accuracy.

Other measures such as the frequency that projections were within an acceptable error range could be useful measures for informing the accuracy of the CRR calculation methods, but these were not employed in the backtesting exercise. Consequently, a couple of years where there may have been great discrepancies between projected and actual enrolments, would adversely and greatly affect the apparent accuracy of the method, even if it did perform well in the majority of years.

The backtest results show that making enrolment projections is an inexact exercise, particularly when predicting a few years into the future. In particular, the methods have tended to under-estimate future enrolments for the time periods studied. The following table is a small and summarized set of the backtest results.

Figure 8: Accuracy Measures of CRR Calculation Methods

	Standalone Methods					Blended or Combined Methods		
	Flatline	5-Yr Moving Avg	4-Yr Weighted Avg	Adjusted 5-Yr Avg	Trending	Last Best by Grade	Mirrored Last Best by Grade	BLENDED FLATLINE - ADJ 5-YR AVG
15-year period (1988-89 to 2002-03)								
One-year-ahead projections								
Over/Under Estimate Percentage	33%	40%	33%	40%	40%	33%	33%	33%
Total Accumulated Deviations	(2,286)	(5,546)	(4,135)	(3,917)	(1,603)	(3,002)	(3,002)	(1,994)
Sum of Absolute Deviations	12,305	22,463	16,649	17,270	16,140	12,720	12,720	11,889
Detailed Sum of Absolute Deviations	25,820	42,529	32,985	36,809	33,441	27,280	27,280	26,703
Three-year-ahead projections								
Over/Under Estimate Percentage	47%	47%	47%	53%	53%	47%	53%	47%
Total Accumulated Deviations	(8,453)	(12,395)	(11,051)	(15,134)	(6,497)	(10,104)	(12,225)	(7,931)
Sum of Absolute Deviations	41,009	62,010	54,617	62,098	58,902	48,976	54,893	42,071
Detailed Sum of Absolute Deviations	67,463	97,369	86,662	90,257	87,594	75,801	84,842	67,963
Five-year-ahead projections								
Over/Under Estimate Percentage	53%	47%	40%	47%	47%	53%	33%	53%
Total Accumulated Deviations	(13,717)	(7,121)	(11,131)	(13,590)	(9,604)	(13,973)	(17,518)	(3,774)
Sum of Absolute Deviations	89,109	116,480	107,915	126,707	120,538	103,471	107,529	99,797
Detailed Sum of Absolute Deviations	122,863	155,332	145,454	158,711	150,573	134,818	148,674	130,601
10-year period (1993-94 to 2002-03)								
One-year-ahead projections								
Over/Under Estimate Percentage	20%	10%	10%	30%	30%	20%	20%	20%
Total Accumulated Deviations	(5,039)	(13,390)	(9,143)	(7,635)	(4,508)	(5,196)	(5,196)	(4,676)
Sum of Absolute Deviations	7,253	14,618	10,762	10,935	8,200	7,326	7,326	6,882
Detailed Sum of Absolute Deviations	15,191	22,334	17,692	22,695	20,492	16,076	16,076	15,565
Three-year-ahead projections								
Over/Under Estimate Percentage	30%	20%	20%	30%	40%	30%	30%	30%
Total Accumulated Deviations	(21,142)	(36,936)	(31,824)	(33,903)	(26,106)	(24,639)	(30,644)	(21,983)
Sum of Absolute Deviations	24,949	37,468	33,845	43,329	34,124	30,576	36,474	25,734
Detailed Sum of Absolute Deviations	35,350	51,718	45,975	55,506	48,761	41,092	45,764	36,824
Five-year-ahead projections								
Over/Under Estimate Percentage	30%	20%	10%	20%	30%	30%	10%	30%
Total Accumulated Deviations	(48,735)	(54,206)	(53,809)	(63,963)	(55,131)	(54,100)	(57,665)	(48,025)
Sum of Absolute Deviations	54,092	69,394	65,237	76,334	75,011	63,344	67,382	55,546
Detailed Sum of Absolute Deviations	70,062	88,376	82,817	93,608	90,822	77,459	91,434	71,753
5-year period (1998-99 to 2002-03)								
One-year-ahead projections								
Over/Under Estimate Percentage	20%	20%	20%	60%	40%	20%	20%	20%
Total Accumulated Deviations	(790)	(1,884)	(1,060)	1,319	(431)	(122)	(122)	(735)
Sum of Absolute Deviations	2,758	3,112	2,679	1,981	2,093	2,086	2,086	2,734
Detailed Sum of Absolute Deviations	7,270	7,601	6,715	7,782	6,812	6,891	6,891	7,213
Three-year-ahead projections								
Over/Under Estimate Percentage	60%	40%	40%	60%	80%	60%	60%	60%
Total Accumulated Deviations	(729)	(9,905)	(5,420)	(1,182)	1,989	493	(1,428)	(992)
Sum of Absolute Deviations	4,536	10,438	7,441	10,609	6,029	5,444	7,258	4,742
Detailed Sum of Absolute Deviations	11,406	16,505	13,871	18,219	14,797	12,010	13,332	11,366
Five-year-ahead projections								
Over/Under Estimate Percentage	40%	0%	0%	20%	40%	40%	0%	40%
Total Accumulated Deviations	(13,566)	(36,350)	(30,191)	(32,867)	(20,581)	(18,220)	(31,611)	(14,360)
Sum of Absolute Deviations	15,430	36,350	30,191	35,529	27,489	20,694	31,611	15,549
Detailed Sum of Absolute Deviations	21,147	37,157	31,692	39,889	34,883	25,616	35,158	22,450

For the chosen blended method, backtesting 21 years of data showed that the trending indicator determined the *Flatline Method* to be used about 60 percent of the time and the *Adjusted 5-Year Average CRR Flatline Method* to be used about 40 percent of the time.

The following table shows projections for the 2003-04 through 2012-13 time period, as determined by a number of different CRR calculation methods. These are the projection numbers **prior** to the final adjustment used to fix the North enrolments at a constant value of 5,500. For the methods presented below, the 2003-04 projections range from 173,583 to 174,295 and the 2012-13 projections range from 143,706 to 146,529.

Figure 9: Student Enrolment Projections from 2003-04 to 2012-13 - Selected CRR Calculation Methods

	Standalone Methods					Blended or Combined Methods		
Prediction for Year:	Flatline	5-Yr Moving Avg	4-Yr Weighted Avg	Adjusted 5-Yr Avg	Trending	Last Best by Grade	Mirrored Last Best by Grade	BLENDED FLATLINE - ADJ 5-YR AVG
2003-04	174,295	173,583	173,737	173,951	173,967	174,047	174,047	174,106
2004-05	171,210	169,893	170,078	170,349	170,414	170,607	170,814	170,867
2005-06	167,791	165,911	166,182	166,590	166,545	166,826	166,709	167,284
2006-07	164,308	162,202	162,363	162,870	162,980	163,127	163,017	163,734
2007-08	160,612	158,398	158,429	159,019	159,067	159,220	159,317	159,982
2008-09	156,909	154,440	154,470	155,131	155,076	155,275	155,817	156,219
2009-10	154,017	151,373	151,394	152,145	151,961	152,230	153,155	153,364
2010-11	151,164	148,425	148,415	149,259	149,006	149,224	150,134	150,552
2011-12	148,685	145,925	145,886	146,851	146,481	146,655	147,858	148,106
2012-13	146,529	143,792	143,706	144,800	144,304	144,440	145,747	146,023

Note: These enrolment projection numbers do not match those listed in Figures 1 and 2 of this report because they are being reported here prior to the final adjustment required to fix the North enrolment at 5,500.